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TITLE : BANDAGE OF UNWOVEN FABRIC AND PRODUCTION THEREOF

ABSTRACT : PURPOSE: To obtain the subject flexible bandage of an unwoven fabric excellent in touch and having resistance to distortion of wound shape by spinning a specific saponified ethylene-vinyl acetate copolymer by means of a melt-blown method, collecting the resultant ultrafine fibers and forming the collected fibers into a sheet shape.

CONSTITUTION: A polymer composed of a saponified ethylene-vinyl acetate copolymer having 40 to 60mol% ethylene content, 0.55 to 0.085l/g intrinsic viscosity and preferably ≥90mol% saponification degree as the main component is spun by means of a melt blown method (preferably at 250 to 300°C and 0.5 to 5kg/cm^2 conveying gas pressure) and the resultant ultrafine fibers having ≤8μm average fiber diameter are collected and formed into a sheet shape, thus obtaining the objective bandage of an unwoven fabric excellent in form- maintaining stability and having a high gas permeability and a high moisture permeability. In addition, a polyurethane having 45 to 75% soft segment content and 0.05 to 0.10l/g intrinsic viscosity and containing a chain-lengthening agent such as a diol may be blended in spinning.

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(54) Title of the Invention: BANDAGE OF NON-WOVEN FABRIC AND PRODUCTION THEREOF

SPECIFICATION

Title of the Invention

BANDAGE OF NON-WOVEN FABRIC AND PRODUCTION THEREOF

What is claimed is:

(1) A bandage of non-woven fabric with the use of melt blown ultra-fine fibers having an average diameter of 8 microns or smaller comprising copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g.

(2) A bandage of non-woven fabric with the use of melt blown ultra-fine fibers having an average diameter of 8 microns or smaller comprising copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated

compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g in an amount of from 95 to 60 weight %, and mixed spinning fibers consisting essentially of polyurethane with soft segment contents of from 45 to 75 weight % and with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 5 to 40 weight %.

(3) A bandage of non-woven fabric with the use of melt blown ultra-fine fibers having an average diameter of 8 microns or smaller comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of from 5 to 40 weight %.

(4) A method for producing a bandage of non-woven fabric comprises steps of melting copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

(5) A method for producing a bandage of non-woven fabric comprises steps of melting copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g in an amount of from 95 to 60 weight %, and copolymers comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of from 5 to 40 weight %, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

(6) A method for producing a bandage of non-woven fabric comprises steps of melting copolymers comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of

from 5 to 40 weight %, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

Detailed Description of the Invention

[Technical field of the invention]

The present invention relates to a bandage of non-woven fabric that is flexible and having comfortable touch with human skin and without loose in winding.

[Prior art]

Conventionally, woven fabrics like gauzes woven with cotton yarn or clothes like knit clothes are employed for bandages. On the other hand, Japanese Laid Open Patent Application No. Shou 61-253063 proposes a bandage of non-woven fabric added with water-repellency. Further, Japanese Laid Open Patent Application No. Shou 51-22855 proposes a bandage of non-woven fabric made from melt processed polyurethane elastic filaments laminated and bonded with the intersections of the filaments. Furthermore, Japanese Laid Open Patent Application No. Shou 60-179059 proposes a material for surgical soma cingulum made of non-woven fabric made by partially heat welding over the entire surfaces of them.

[Problems to be solved by the invention]

Conventional bandages like gauzes are felt uncomfortable for human skin and apt to loose in winding because of their inferior configuration stability and poor elasticity. Further, bandages employing non-woven fabric are felt uncomfortable for human skin because many bonding points for stabilizing configuration of the non-woven fabric solidify the texture. Furthermore, the conventional bandages of non-woven fabric made from polyurethane elastic filaments fail to obtain sufficient flexibility because of their thickness and cause an oppressive sensation for the users when used as the bandages.

It is an object of the present invention to provide a non-woven fabric appropriate for bandages that is flexible and having comfortable touch with human skin, having excellent elasticity or elongation property, having superior configuration stability without loose in winding, and sufficient air permeability or moisture permeability.

[Means to solve the problem]

The present invention provides a bandage of non-woven fabric with the use of melt blown ultra fine fibers having an average diameter of 8 microns or smaller comprising copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g.

Further, the present invention provides a bandage of non-woven fabric with the use of melt blown ultra-fine fibers having an average diameter of 8 microns or smaller comprising copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g in an amount of from 95 to 60 weight %, and mixed spinning fibers consisting essentially of polyurethane with soft segment contents of from 45 to 75 weight % and with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 5 to 40 weight %.

Furthermore, the present invention provides a bandage of non-woven fabric with the use of melt blown ultra-fine fibers having an averaged diameter of 8 microns or smaller comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of from 5 to 40 weight %.

Still further, the present invention provides a method for producing a bandage of non-woven fabric comprises steps of melting copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

Still further, the present invention provides a method for producing a bandage of non-woven fabric comprises steps of melting copolymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound with ethylene contents of from 40 to 60 mol % and with intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g in an amount of from 95

to 60 weight %, and copolymers comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of from 5 to 40 weight %, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

Additionally, the present invention provides a method for producing a bandage of non-woven fabric comprises steps of melting copolymers comprising mixed spinning fibers of polymers consisting essentially of polyurethane composed of chain elongation agent primarily consisting of diol with intrinsic viscosity [η] in the range from 0.05 to 0.10 liter/g in an amount of from 95 to 60 weight % and polyolefin in an amount of from 5 to 40 weight %, forming ultra-fine fibers having an average diameter of 8 microns or smaller by a melt blown method, and molding the melt blown ultra-fine fibers obtained by collecting the fibers flow into sheet form.

Namely, the present invention provides a production of non-woven fabrics with the use of ultra-fine fibers obtained by a melt blown method for polymers consisting essentially of ethylene-vinyl acetate copolymer saponificated compound having specified range of physical property, for polymers of ethylene-vinyl acetate copolymer saponificated compound and other polymers, or obtained by a melt blown method for mixed polymers of polyurethane and polyolefin each having uniformity, flexibility and having comfortable touch with human skin and adaptive for a substrate for bandages.

The ethylene-vinyl acetate copolymer saponificated compound of the present invention employs polymers with ethylene contents of from 40 to 60 mol % and having an intrinsic viscosity [η] in the range from 0.055 to 0.085 liter/g measured about its polymer solution. When the ethylene contents are fewer than 40 mol %, favorable fibers flow cannot be formed or granular articles like insoluble grains are increasingly mixed in the non-woven fabrics because the heat stability of the polymer degrades and the melt viscosity elevates, and insoluble grains, i.e. gel-like grains appear resulting in obstructing a stable melt blown spinning. On the other hand, when the ethylene contents exceed 60 mol %, a tactile of the non-woven fabrics

becomes uncomfortable similar to polyolefin's or waxes' because rigidity, drawing property, dyeing property, hygroscopic property and heat resistance each specific with polyvinyl alcohol degrades. Further, when the intrinsic viscosity [η] of the polymer falls outside the range of from 0.055 liter/g to 0.085 liter/g and is under 0.055 liter/g, the non-woven fabrics becomes inappropriate as the substrate for bandages. It is because any non-woven fabric with excellent uniformity cannot be obtained by the reason that the small intrinsic viscosity [η] of the polymer means small melt viscosity, lacks enough spinnability, fails to form favorable fibers flow sufficiently fined, or because numbers of fine ball-shaped grains mix in the non-woven fabrics, or because physical properties like strength, lumbus and heat resistance of the non-woven fabrics degrade. On the other hand, even when the intrinsic viscosity [η] of the polymer exceeds 0.085 liter/g, the non-woven fabrics also becomes inappropriate as the substrate for bandages. It is because any non-woven fabrics with excellent uniformity cannot be obtained by the reason that the melt blown method fails to form favorable fibers flow sufficiently thinned and oriented, resulting in weak strength or coarse and hard texture of the non-woven fabrics. Additionally, the saponification degree of the vinyl acetate is 80 mol % or greater, preferably 90 mol % or greater. Small saponification degree not only deteriorates hygroscopic property and heat resistance of the non-woven fabrics but also hardens the texture of the non-woven fabrics thereby denying the feasibility as the substrate for the bandages.

Further, the polyurethane employed in the present invention may be obtained by the reaction of a polymer diol having mean molecular weight of 500-3000, such as at least one kind selected from among a group of polyester diol, polyether diol, polyesterether diol, polycaprolactone diol, polycarbonate diol, etc., with organic polyisocyanate, e.g., at least one kind of organic diisocyanate selected from among a group of aromatic diisocyanate such as tolylene diisocyanate, xylylene diisocyanate, diphenylmethane diisocyanate, hydrogenation diphenylmethane diisocyanate, isophorone diisocyanate; aliphatic diisocyanate having cyclic group, alicyclic diisocyanate, etc., and, as a chain elongation agent, with a low molecular weight compound having molecular weight of 400 or less with at least two active hydrogen atom such as at least one kind of compound selected from among a group of diol, amino alcohol, diamine, etc. Furthermore, a preferable soft segment for obtaining

flexibility and elastic property include polymer diol with a structure mainly containing polyester diol having mean molecular weight of 500-3000 polymerized from at least 40 weight % of aliphatic diol with side chain having carbon number of 5-12 and dicarboxylic acid, which acts as a chain elongation agent. The polyurethane may be produced by melt polymerization method, block polymerization method or solution polymerization method after selecting the foregoing polymer diol, organic diisocyanate and chain elongation agent with desired composition ratio. Additionally, the amount of the polymer diol as the soft segment in the production of the polyurethane is 45-75 weight % in order to obtain the non-woven fabric with excellent uniformity, and the polyurethane may be polymerized with the use of a chain elongation agent mainly containing diol. Regarding the intrinsic viscosity [η] after pelletization, in the case where the polyurethane is used after pelletization, it is adjusted in the polymerization to high viscosity in the range of 0.06-0.12 liter/g, considering the decrease of the viscosity in melt spinning of the polyurethane. In the case where the non-woven fabric made from ultra-fine fiber is obtained by direct melt blown spinning method without pelletization after the polymerization by melt polymerization method, the intrinsic viscosity [η] after spinning may be adjusted in the range of 0.05-0.10 liter/g because it is unnecessary to consider the decrease of viscosity in the spinning. The amount of the soft segment in the polyurethane is in the range of from 45 weight % to 75 weight %. When the amount of the soft segment is less than 45 weight %, although acceptable in a viewpoint of spinning property or ultra-thinning, it is unfavorable in the viewpoints of making the non-woven fabric flexible, elastic property, stabilization of configuration, and smoothness of the surface or tactility with human skin as a substrate for bandages, etc. On the other hand, when the amount of the soft segment exceeds 75 weight %, although acceptable in the viewpoints of flexibility as non-woven fabric, the non-woven fabric made from ultra-fine fiber with favorable texture cannot be obtained because spinning property or ultra-thinning of the fiber degrades. Further, when the intrinsic viscosity [η] of the polyurethane is smaller than the foregoing range, any sufficiently thinned fiber cannot be obtained and the resultant non-woven fabric is composed of fibers having various uneven thickness. Furthermore, when the intrinsic viscosity [η] of the polyurethane is greater than the foregoing range, the melt viscosity becomes high, and any fiber flow

of favorable ultra-fine fiber is not formed.

The polyolefin employable in the present invention is at least one kind of polymer selected from among a group of the polyolefin such as polyethylene, ethylene propylene copolymer, ethylene 1-butene copolymer, ethylene 1-octene copolymer, polypropylene, polybutene, etc., or those polyolefins having wetting ability. It is desirable that the melt viscosity expressed by meltflow rate (abbreviated as MI below) value measured in accordance with ASTMD-1238 method is 30-100 g/10 minutes about polyolefin, and 70-230 g/10 minutes about polyolefin with wetting ability. When the MI value is outside the foregoing range, the non-woven fabric made from ultra-fine fiber with excellent uniformity cannot be obtained because unfavorable irregular fiber flow generates.

In the case where mix spun fibers are obtained by blending the polymers, the blending ratio of ethylene-vinyl acetate copolymer saponificated compound and polyurethane is settled to be ethylene-vinyl acetate copolymer in an amount of 95-60 weight % and polyurethane in an amount of 5-40 weight %. When the amount of the ethylene-vinyl acetate copolymer is fewer than the foregoing range, characteristic features such as hygroscopicity, affinity with medical agents or texture, etc., based on the ethylene-vinyl acetate copolymer is not achieved. On the other hand, the blending ratio of polyurethane and polyolefin is settled to be polyurethane in an amount of 95-60 weight %, and polyolefin in an amount of 5-40 weight %. In the case where the amount of the polyurethane is fewer than the foregoing range, elasticity behavior reduces and characteristic feature of favorable texture is not achieved.

Regarding the melt blown spinning method of the polymer for producing the non-woven fabric as the substrate for bandages, ultra-fine fibers having average fiber diameter of 8 micron or smaller are obtained and fibers flow with excellent uniformity is formed by means of spinning under the conditions of the spinning temperature of 250-300 ℃, the carrier gas pressure (gauge pressure) of 0.5-5 kg/cm^2. By collecting the fibers flow in sheet form over a conveyer net, a wide non-woven fabric made from ultra-fine fiber with excellent uniformity can be obtained. The non-woven fabric made from ultra-fine fiber thus obtained may be used as virgin bandages soon after formation. A compact process on at least one surface of the non-woven fabric by means of pressing or hot pressing, or an adherence

process adhering in non-consecutive pattern almost all the interchanges of the fibers over at least one surface of the non-woven fabric may be conducted. In other words, typical examples of the compact process for the non-woven fabric include pressing on one surface or both surfaces of the collected non-woven fabric made from ultra-fine fibers with a roller or an endless belt each without heating or adhering the interchanges of the fibers after conducting the compact process by pressing with a roller or an endless belt each heated to the temperature of softening the fibers. Further, employing an emboss roller or an endless belt each having deep convexoconcave pattern or pin point for at least one of the foregoing roller or endless belt used for pressing is desirable in the viewpoints of flexibility, texture, elasticity, and so on.

Furthermore, other thermoplastic polymers, e.g., any polymer selected from among polyolefins such as polyethylene, ethylene propylene copolymer, or ethylene 1-octene copolymer, polyamides such as polyvinyl alcohol, nylon-6, nylon-66, or nylon-610, polyesters such as polyethylene terephthalate, or polybutylene terephthalate, etc., may be blended in spinning the ethylene-vinyl acetate copolymer saponificated compound of the present invention. Blending amount of the polymer is 40-5 weight %. Still further, pigments or master batches prepared by dispersing the pigments in the thermoplastic polymer beforehand, additives such as titanium oxide, fine silicon oxide, etc., for preventing adhesions of fibers may be blended to the ethylene-vinyl acetate copolymer saponificated compound of the present invention.

A mass per unit area of the non-woven fabric made from meltblown ultra-fine fiber for bandages in the present invention may be decided depending on the orientated application, however, is generally in the range of 30-200 g/m^2.

A bandage of non-woven fabric with the use of meltblown ultra-fine fibers according to the present invention provides the bandage of the non-woven fabric having hydrophilic property and oleophilic property, excellent chemical resistance, superior elasticity or elongation property, improved gas permeability and moisture permeability, flexibility, comfortable touch with human skin, and favorable tactile.

[Examples]

In the following Examples are described several preferred

embodiments to concretely illustrate the invention, however, it is to be understood that the invention is not intended to be limited to the specific embodiments. Parts, and % in Examples means parts by weight and weight % respectively in the cases where there are another definition.

Regarding the intrinsic viscosity [η] of polymer in the present invention, a solution of the ethylene-vinyl acetate copolymer saponificated compound dissolved in a mixed solvent of phenol in an amount of 85 weight % and water in an amount of 15 weight %, or a solution of the polyurethane dissolved in N,N-dimethylformamide, was measured at the temperature of 30 ℃ with the use of capillary tube type viscometer, and the intrinsic viscosity [η] was determined by means of the following formula:

$$\eta_{sp} = (t - t_0)/t_0 = (t/t_0) - 1$$

$$[\eta] = \lim_{c \to 0} \eta_{sp}/c$$

wherein,

"t " is a time (second) taken the solution for flowing down;

"t_0" is a time (second) taken the solvent for flowing down; and

"c" is a concentration (g/liter) of the polymer.

Example 1

Melting ethylene-vinyl acetate copolymer saponificated compound with 55 mol % of ethylene content, 98 mol % of saponification degree, and having an intrinsic viscosity [η] =0.067 liter/g by the use of an extruder, with the use of a die for melt blown method arranging discharge nozzles having diameter of 0.3 mm in a row with intervals of 1 mm and disposing gas jet slits of 0.25 mm wide on both sides of the row of the discharge nozzles, and discharging at the melt spinning temperature of 280 ℃ and discharge quantity per nozzle of 0.2 g/minute, and spinning under the conditions of carrier air temperature of 285 ℃, air gauge pressure of 1.5 kg/cm^2 in accordance with melt blown method, non-woven fabric made by melt blown ultra-fine fibers having average mass per unit area of 65 g/m^2 was obtained by collecting the spun ultra-fine fibers flow over an advancing belt conveyor-net with a constant velocity in the collecting machine installed at about 25 cm under the die.

The observation of the melt blown fibers of the non-woven fabric under a scanning electron microscope (abbreviated to SEM below) with

enlarging 500 magnifications showed that the average diameter of the fibers was about 4.4 microns. Additionally, the non-woven fabric made from ultra-fine fibers had minute accumulation situation and flexible texture.

By conducting pressing process on one surface of the non-woven fabric of melt blown ultra-fine fibers with heating roller under the conditions of pressing area of 20 %, line pressure of 5 kg/cm, roller temperature of 125 ℃, and processing speed of 10 m/minute, a non-woven fabric with almost all the fibers adjacent the surface adhering was obtained. Because the non-woven fabric was superior in its high strength, flexibility and elongation property, its usage as bandage provides comfortable touch with human skin, favorable tactile and good feeling of wearing without slipping. Additionally, the non-woven fabric had also capability of being employed as a substrate for bandages with medical agents applied over them because it had excellent adaptability with the medical agents and because it was superior in chemical resistance for the medical agents.

Comparative Example 1

The melt blown spinning method was conducted with the use of the same apparatus as Example 1, employing the ethylene-vinyl acetate copolymer saponificated compound with ethylene content in an amount of 55 mol %, saponification degree of 98 %, and intrinsic viscosity $[\eta] = 0.092$ liter/g. However, because the spinnability was not practical under the same condition as Example 1, the conditions were changed to spinning temperature of 300 ℃, carrier air temperature of 300 ℃, and air gauge pressure of 5 kg/cm^2 respectively. However, any extremely thinned fiber was not obtained because melt viscosity was high, and the thickness of the fibers is not uniform having average diameter of about 12 microns even in the case of a fine fiber, besides, any fibers flow having excellent uniformity was not generated. Further, the non-woven fabric prepared was coarse and hard, having poor strength, and it was not suitable as a substrate for bandages.

Example 2

The melt blown spinning method was conducted with the use of the same apparatus as Example 1, kneading the ethylene-vinyl acetate copolymer saponificated compound with 45 mol % of ethylene content, saponification degree of 98 %, and intrinsic viscosity $[\eta] = 0.058$ liter/g in an

amount of 39 parts by weight and polypropylene containing 20 weight % of yellowish brown pigments in an amount of 1.5 parts by weight. The spinnability was good under the same spinning condition as Example 1, and an excellent human skin-colored non-woven fabric with the use of the melt blown ultra-fine fibers having superior uniformity without dark and pale color speckles and with average mass per unit area of 90 g/m^2 was obtained.

The observation of the non-woven fabric made from ultra-fine fibers under the SEM showed that the average diameter of the fibers was about 5.3 microns, and the non-woven fabric had tactile and texture of a cloth made with cotton.

Embossing was conducted over the non-woven fabric made from ultra-fine fibers with the use of the emboss roller having deep engraving of texturing pattern and under the conditions of roller temperature of 120 ℃ and line pressure of 3 kg/cm. The non-woven fabric had high elongation breaking strength, comfortable touch with human skin because of its flexibility and elastic property or elasticity, and accordingly, its usage as bandage provides favorable feeling without discomfort in wearing.

Example 3

By polymerizing 1 mol (54 %) of poly 3-methyl 1,5-pentane adipate glycol with mean molecular weight of 1500 prepared by condensation polymerization of 3-methyl 1,5-pentane diol and adipic acid, 4 mol of 4,4'-diphenylmethane diisocyanate, and 3 mol of butylene glycol with melt polymerization method, polyurethane having intrinsic viscosity [η] = 0.093 liter/g was obtained. After the melt polymerization, the polyurethane was taken out as strands and cut with pelletizer, thereby yielding polyurethane pellets. Blending 35 parts by weight of polyurethane pellets and 65 parts by weight of ethylene-vinyl acetate copolymer saponificated compound with ethylene content of 55 mol %, saponification degree of 96 mol %, and intrinsic viscosity [η] of 0.075 liter/g, melting the blends of pellets by means of an extruder, the melt blown spinning method was conducted with the use of the same apparatus as Example 1, under the conditions of melt spinning temperature of 295 ℃, carrier air temperature of 300 ℃, and air gauge pressure of 2.5 kg/cm^2, non-woven fabric made by melt blown ultra-fine fibers having average mass per unit area of 110 g/m^2 was obtained by collecting the spun ultra-fine fibers flow in sheet form over an advancing belt

conveyor-net in the collecting machine. The non-woven fabric made from ultra-fine fibers had excellent uniformity, and the average diameter of the fibers was about 6.9 microns.

By conducting a calendar process on one surface of the non-woven fabric of melt blown ultra-fine fibers with the same condition as Example 1, a non-woven fabric having a minute surface with almost all the fibers adjacent the surface fusioning was obtained. The non-woven fabric had affluent elasticity, and was suitable as a substrate for bandages with comfortable touch with human skin because of its flexibility.

Comparative Example 2

Comparative Example 2 was conducted similarly with blending melt blown spinning method of Example 3 after the polymerization of hyperviscosity polyurethane having intrinsic viscosity $[\eta] = 0.15$ liter/g replacing the polyurethane pellets in Example 3. Namely, the melt blown spinning method was conducted under the same condition as Example 3. As a result, although there was no obstruction in spinnability before the short lapse of about 2 hours, the thread forming property by melt blown degraded rapidly after the long lapse exceeding 2 hours, and breaking down of the fibers occurred frequently. A stable fiber forming was unable to be achieved by the influence of broken fiber tips with granular articles like insoluble grains stuck coexisting in non-woven fabric, resulting in non-woven fabric not suitable as a substrate for bandages.

Example 4

By polymerizing 1 mol (55 %) of polybutylene adipate glycol with mean molecular weight of 2000, 5 mol % of 4,4'-diphenylmethane diisocyanate, and 4 mol % of butylene glycol with melt polymerization method, polyurethane with intrinsic viscosity $[\eta] = 0.110$ liter/g was obtained. Blending 75 parts by weight of polyurethane pellets and 25 parts by weight of favorable fluidity polyethylene having melt index of 35, melting the blends by means of an extruder, the melt blown spinning method was conducted with the use of the same apparatus as Example 1, under the conditions of melt spinning temperature of 285 ℃, carrier air temperature of 300 ℃, and air gauge pressure of 2.2 kg/cm^2, non-woven fabric made by melt blown ultra-fine fibers having average mass per unit area of 75 g/m^2 was

obtained by collecting the spun ultra-fine fibers flow in sheet form over an advancing belt conveyor-net in the collecting machine. Embossing was conducted over one surface of the non-woven fabric made from ultra-fine fibers with the use of the pin point emboss roller heated to the temperature of 135 ℃, thereby adhering fibers partially making patterns. The bandages made of the non-woven fabric obtained had excellent elasticity, and was suitable as bandages for joint region, etc., having comfortable touch with human skin because of its flexibility.

Example 5

By polymerizing 1 mol (54 %) of poly 3-methyl 1,5-pentane adipate glycol with mean molecular weight of 1500 prepared by condensation polymerization of 3-methyl 1,5-pentane diol and adipic acid, 4 mol of 4,4'-diphenylmethane diisocyanate, and 3 mol of butylene glycol with melt polymerization method, polyurethane with intrinsic viscosity $[\eta]$ = 0.103 liter/g was obtained. After the melt polymerization, the polyurethane was extruded as strands thereby yielding polyurethane pellets. Blending 80 parts by weight of polyurethane pellets and 20 parts by weight of polyethylene pellet, the melt blown spinning method was conducted with the use of the same melt blown apparatus as Example 1, under the conditions of melt spinning temperature of 285 ℃, carrier air temperature of 300 ℃ and air gauge pressure of 2.0 kg/cm^2, non-woven fabric made by melt blown ultra-fine fibers having average mass per unit area of 90 g/m^2 was obtained by collecting the spun ultra-fine fibers flow over an advancing belt conveyor-net in the collecting machine. The non-woven fabric made from ultra-fine fibers had excellent uniformity, and the average diameter of the fibers was about 5.6 microns.

By conducting a calendar process on one surface of the non-woven fabric of melt blown ultra-fine fibers with the same condition as Example 1, a non-woven fabric having a minute surface with almost all the fibers adjacent the surface fusioning was obtained. The non-woven fabric had excellent configuration stability and elasticity, and was suitable as a substrate for bandages with comfortable touch with human skin because of its flexibility.

[Effects of the Invention]

The bandage of non-woven fabric with the use of melt blown ultra-fine fibers according to the present invention has an extremely high

elongation breaking strength, flexibility and comfortable touch with human skin having supreme elasticity or elongation property, extinguish air permeability and moisture permeability, hydrophilic property and oleophilic property, and chemical resistance property. Further, it is a bandage of non-woven fabric that can be used with applying medical agent on the surface.